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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/680,895

10/08/2003

Helen Zhu

P1052-LAM (RAO#1)

5978

48008

7590

03/16/2006

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EXAMINER

NGUYEN, THANH T

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 03/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/680,895	Applicant(s) ZHU ET AL.	
	Examiner Thanh T. Nguyen	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-20 and 24-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-20 and 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

The request filed on 1/3/06 for a Request for Continued Examination (RCE) under 37 CFR 1.114 is acceptable and an RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Arita et al. (U.S. Patent Publication No. 2004/0036076).

Referring to figures 1a-4g, Arita et al. teaches a method of stripping an integrated circuit (IC) structure having a photoresist material, an organosilicate glass (OSG) material (see paragraph# 33) and a via etched into said IC structure (see figures 1a-1g), comprising:

feeding a nitrous oxide (N₂O) gas into a reactor (see paragraph# 40, noted that gas have to introduce into the chamber/reactor for the subsequence process);

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generating a plasma in the reactor (see paragraph# 40, noted that gas introduces in the chamber and plasmanizes in the chamber before performing the etching process), stripping said photoresist (11, see figures 1e-1f);

generating an organic plug (10) that occupies the via, and stripping the organic plug with the N₂O gas (see paragraph# 40, figures 1d-1f) ; and

generating high selectivity between the photoresist and the OSG (see paragraph# 40, noted that removing the photoresist layer without removing the OSG material would generate high selectivity, see figure 1e-1f).

Regarding to claims 2, 7, 18, the photoresist is an organic photoresist (resin, see paragraph# 39).

Regarding to claims 3, 9, 19, stripping the photoresist is one of a plurality of steps performed during a dual damascene process (see figures 1e-1g).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 6-20, 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arita et al. (U.S. Patent Publication No. 2004/0036076) as applied to claims 1-3 above, in view of Chen (U.S. Patent No. 5,970,375) and Ho et al. (U.S. Patent Publication No. 2005/0014362).

Referring to figures 1a-4g, Arita et al. teaches a method of stripping an integrated circuit (IC) structure having a photoresist material, second intermediate layer (7, hardmask) an organosilicate glass (OSG) material (see paragraph# 33) and a via etched into said IC structure (see figures 1a-1g), comprising:

feeding a nitrous oxide (N_2O) gas into a reactor (see paragraph# 40, noted that gas have to introduce into the chamber/reactor for the subsequence process);

generating a plasma in the reactor (see paragraph# 40, noted that gas introduces in the chamber and plasmanizes in the chamber before performing the etching process), stripping said photoresist (11, see figures 1e-1f);

generating a high selectivity between the first photoresist layer (11) and the second intermediate layer (7, removing the photoresist film without removing the hard mask layer would generate high selectivity, see figure 1e-1f)

generating an organic plug (10) that occupies the via, and stripping the organic plug with the N_2O gas (see paragraph# 40, figures 1d-1f) ; and

generating high selectivity between the photoresist and the OSG (see paragraph# 40, noted that removing the photoresist layer without removing the OSG material would generate high selectivity, see figure 1e-1f).

Regarding to claims 7, 18, the photoresist is an organic photoresist (resin, see paragraph# 39).

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Regarding to claims 9, 19, stripping the photoresist is one of a plurality of steps performed during a dual damascene process (see figures 1e-1g).

Regarding to claims 10-11, intermediate layer is a SiON, cap layer (7, see figure 1a-1b, paragraph#37).

Regarding to claim 12-13, the intermediate layer is a silicon nitride hard mask layer (see figure 1a-1b, paragraph#37).

Regarding to claim 14, etching a via (22) into the second cap layer and the third OSG layer (5), stripping the photoresist layer (9, see figure 1a-1b), generating an organic plug (10) within the via; and stripping the organic plug with the N₂O gas (see paragraph# 40, figures 1b-1f).

Regarding to claim 16, applying another first photoresist layer (11, see figure 1d).

Regarding to claim 25, etching a second trench into the third OSG layer (see figures 1f-1g).

Regarding to claim 26, using N₂O gas to trip the organic plug (see paragraph# 40).

However, the reference does not teach stripping the photoresist with N₂O gas, stripping the photoresist is performed in the same reactor chamber for etching the OSG material, forming the organic plug within the via occupies part of the third OSG layer.

Chen teaches stripping the photoresist with N₂O gas (see figures 6-7, 10-11, col. 10, lines 51-67, col.11, lines 1-13, col. 15-16, lines 56+), stripping the photoresist is performed in the same reactor chamber for etching the OSG material (see col. 17, lines 3-9).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would stripping the photoresist with N₂O gas, stripping the

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photoresist is performed in the same reactor chamber for etching the OSG material, forming the organic plug within the via occupies part of the third OSG layer in process of Arita et al. as taught Chen because performing in the same chamber would reduce contamination during transferring from one chamber to another, and removing the photoresist film by using N₂O would protect the via, eliminate the problem of faceting of the corners of the mask, thereby eliminating the formation of bowed sidewall.

Ho et al. teaches forming the organic plug (27) within the via occupies part of the third OSG layer (22, see figure 2c).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would forming the organic plug within the via occupies part of the third OSG layer in process of Arita et al. as taught by Ho et al. because the process would eliminates the step of etchback during the formation of dual damascene process.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

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with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4, 6-20, 24-26 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 6,916,697. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the present invention and the patent teach feeding a nitrous oxide gas into a reactor, generating plasma in the reactor, stripping the photoresist film and the organic plug with nitrous gas.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (See **MPEP 203.08**).



Thanh Nguyen